Committed Intra-Hour Scheduling, Version 2

Effective: 12/20/11

In its 2012-2013 rate case, BPA proposed offering a Committed Intra-Hour Scheduling Pilot Program (CIH Pilot) under which wind generators that commit to submitting schedules every 30 minutes and meet scheduling accuracy metrics are eligible for a reduced Variable Energy Resource Balancing Service (VERBS[1]) rate and are exempt from Persistent Deviation penalties. BPA's 2012-13 Rate Case Record of Decision adopted a rate discount and a forecast of balancing reserve capacity associated with the pilot.

This business practice sets forth BPA's requirements for participation in the CIH Pilot and other details.

Version 2 of this Business Practice refines the scheduling accuracy metrics to make them more understandable and to add a dead band to the metric. This version also describes how BPA will treat specific intervals for scheduling accuracy metrics where generation levels may be affected by DSO-216 or transmission curtailments.

Specific changes include:

- Deleted step B.1.d
- Added new section E
- Rewrote steps F.1 amd F.7 and added steps F.2-F.6
- Rewrote section G.
- Changed 15 calendar days to 10 business days in step H.1
- Added step H.2
- Added "unwaived" to step H.3
- Moved section H to section D

This business practice sets forth BPA's requirements for participation in the CIH Pilot and other details.

A. Eligible CIH Pilot Participants and Resources

1. Any Customer[2] that operates a wind facility within BPA's Balancing Authority Area and

[1] "Variable Energy Resource Balancing Service," as described in the ACS-12 rate schedule and General Rate Schedule Provisions. Also referred to as "Wind Balancing Service" in the ACS-10 rate schedule.
[2] Any customer taking service under Use of Facilities (UFT), Formula Power Transmission (FPT), Integration of Resources (IR), Part II or Part III of the OATT.

meets the conditions outlined in this Business Practice may participate in BPA's CIH Pilot. For a wind facility being developed in phases, any phase of a wind facility may participate in the CIH Pilot so long as the phases are each metered and scheduled independently and is not otherwise interdependent with any other phase. Each subsequent phase will need to prequalify independently if the phase is to be included in the CIH Pilot.

2. Participation in the CIH Pilot is limited to a maximum of 1200 MW of CIH Pilot Resources. BPA will offer participation in the CIH Pilot on a first come first served basis to those who have met prequalification requirements and demonstrated the ability to meet scheduling accuracy metrics for at least two calendar weeks. BPA retains the right to increase or decrease the limit during the Pilot. Any increase or decrease to the participation limit does not constitute a termination of the CIH Pilot or any customer's participation in the Pilot. BPA may reduce a participant's limit with 30 days notice or immediately if system reliability is jeopardized.

B. Prequalifying Information Required

1. Potential Participants are required to:
   a. Notify their BPA Transmission Account Executive in writing of interest in participating.
   b. Identify the CIH Pilot Resources that will be included in the Pilot, and provide both POR[1] and POD[2](s) for the wind energy.
   c. Inform BPA about the methods by which the potential participant expects to achieve scheduling accuracy that is consistent with or superior to the schedule error metrics described below. BPA will apply the same performance metric regardless of the scheduling method used.
   d. If the POD for the CIH Pilot Resource[3] is to load outside BPA's Balancing Authority Area, BPA will ensure the Sink[4] Balancing Authority and any intermediate Balancing Authorities have business practices that support changes in schedules from 0 MW to nameplate prior to approving participation.

[1]Point of Receipt is an interconnection on the Transmission Provider's Transmission System where capacity and energy will be made available by the Delivering Party; An OASIS field on a TSR that is the scheduling POR.
[2]Point of Delivery is a point on the The Transmission Provider's Transmission System where capacity and energy transmitted by the Provider will be made availabe to the Receiving Part; An OASIS field on a TSR that is the scheduling POD.
[3]A wind facility identified as participating in the CIH Pilot.
[4]An OASIS field on a TSR that is the contractual POD.

e. If the POD for the CIH Pilot Resource is to load inside BPA's Balancing Authority Area, the potential participant must provide BPA with acknowledgement from the load that it has a CIH Balancing Resource that it will schedule on each half hour to the load. The acknowledgement must include the resource name and POR. Participants may change the assigned CIH Balancing Resource with thirty days notice to BPA.

f. Prior to BPA allowing a customer to participate in the Pilot and applying the VERBS rate for the CIH Pilot (Section III.E.5 of BPA's ACS-12 rate schedules), the potential participant must demonstrate for at least two weeks its ability to meet the scheduling accuracy metric.

g. The standard VERBS rate (Section III.E.2 of BPA's ACS-12 rate schedules) will apply during the period that the potential participant is providing prequalifying information to BPA and demonstrating the ability to meet the scheduling accuracy metric.

C. Reserve Allocation, Generation Imbalance and Energy Imbalance

1. Reserve Allocation: The reserve allocation for a CIH Pilot Resource that BPA will use for DSO 216 limits will be reduced by 34% from the base VERBS level.
2. Energy Imbalance[1] risk: For wind energy sinking to loads within the BPA BA, a CIH Pilot Balancing Resource[2] must be identified, as noted above in B.1.f above. If the intra-hour schedule is adjusted for the wind plant but Energy Imbalance was increased instead of adjusting the CIH Balancing Resource output, such increases or patterns of imbalance could result in Persistent Deviation Penalties for Energy Imbalance.
3. CIH Pilot Resources and CIH Pilot Balancing Resources are subject to Generation Imbalance. Generation Imbalance accounting for CIH Pilot Resources and CIH Pilot Balancing Resources is on half-hour intervals. (See the Generation Imbalance Business Practice).
4. CIH Pilot Resources are exempt from Persistent Deviation Penalties for Generation Imbalance.
5. CIH Pilot Balancing Resources are subject to Persistent Deviation Penalties.

D. Compliance with Dispatch Orders

1. CIH Pilot Participants are subject to Dispatch Orders, including Curtailments, generation

[1]Difference occurring between hourly scheduled amount and hourly metered (actually-delivered) amount associated with transmission to a load located in BPA's Balancing Authority Area or from a generation resource located within BPA's Balancing Authority Area.
[2]A dispatchable resource within or outside of BPA Balancing Authority that is available on the half hour to the load served by the CIH Pilot Resource.

limits and Dispatch Standing Order No. 216.

2. A CIH Pilot Participant[1] that does not respond appropriately to a Dispatch Order[2] is subject to a Failure to Comply[3] Penalty.

E. CIH Pilot Resource Scheduling for DSO-216, Curtailments, and iCRS System Failures

1. During a DSO-216 limit generation event, the Pilot Resource is expected to comply with the limit while the DSO-216 is in effect. For the subsequent scheduling interval, the Customer should schedule as accurately as possible. In recognition that inaccuracy could result from using the generation value during the DSO-216 limit generation event, BPA will exclude the subsequent schedule interval from scheduling accuracy metrics.
2. During a DSO-216 schedule curtailment the generator does not need to limit their generation in response to the DSO-216 schedule curtailment if there are no other transmission curtailments affecting e-Tags sourced at the CIH Pilot Resource. The DSO-216 schedule curtailment will decrease the station control error for the scheduling interval and BPA will include that interval in scheduling accuracy metrics.
3. During a transmission curtailment, Customers are expected to comply and limit generation to not exceed the sum of remaining approved e-Tags during the curtailment. In recognition that scheduling inaccuracy in subsequent intervals could result from using the generation value during the transmission curtailment, BPA will exclude the subsequent schedule interval from scheduling accuracy metrics.
4. During an iCRS[4] Generation Advisor System Failure whereby iCRS ceases to produce the average generation value that we will use for determining scheduling accuracy performance (as explained further in Section F below), the Customer should schedule the

[1] An entity that operates a wind facility within BPA's Balancing Authority Area, has notified BPA of its intent to participate in the CIH Pilot, demonstrated that it can meet the schedule accuracy and other requirements for participation, and provided BPA written acknowledgement that the terms of this business practice will govern participation.
[2] Order or directive from Transmission Services to dispatch, curtail, redispatch, limit output, or shed load. Dispatch Orders may be communicated by various methods including, but not limited to: phone call (e.g. to redispatch generation up or down); electronic signal (e.g. via direct telemetry or private web application to limit generation according to DSO216); or NERC e-Tagging system (e.g. to curtail transmission schedules and the generation using those schedules).
[3] The consequences of non-compliance as defined in the Failure to Comply Business Practice in effect at the time.
[4] BPA's Integrated Curtailment and Redispatch System, as implemented through BPA's Generation Advisor web application.

subsequent scheduling interval as accurately as possible. In recognition that inaccuracy could result from unavailability of the average generation value, BPA will exclude the subsequent schedule interval from scheduling accuracy metrics.

F. Schedule Accuracy Metrics

1. BPA will verify on an ongoing basis that the intra-hour schedule used is at least as accurate as 30-minute persistence scheduling. The baseline metrics for accuracy comparison shall include a capacity, energy, and accumulated energy component.
2. 30-Minute Persistence Scheduling: The generator's schedule for the next schedule interval is the generator's 1-minute average of the actual generation 30 minutes prior. For example, the generator's schedule for 2:00 to 2:30 is the generator's actual average generation from 1:29 to 1:30 and the generator's schedule for 2:30 to 3:00 is the generator's actual average generation from 1:59 to 2:00. Through iCRS Generation Advisor, BPA will provide the average generation value that we will use for determining scheduling accuracy performance. The average value will be update within 1 minute after H-x:30 and H-x:00.
3. A 20 minute ramp duration is used to ramp from the second half of the hour schedule to first half of the hour schedule beginning at XX:50 and ending at XX:10. A 10 minute ramp duration is used to ramp from the first half of the hour schedule to the second half of the hour schedule beginning at XX:25 and ending at XX:35.
4. Capacity Component: For the capacity component, the largest absolute value of the actual 1-minute averaged station control error should be less than or equal to the largest absolute value of the 1-minute averaged station control error calculated from 30-minute persistence schedule plus a capacity component deadband over the last seven (7) days. The capacity component deadband is the greater of 1 MW or 2 percent of the largest absolute value of the 1-minute averaged station control error calculated from 30-minute persistence schedule over the last seven (7) days.

$$MAX\left(\left|SCE_{1\min\ Ave,Actual}\right|\right) \le MAX\left(\left|SCE_{1\min\ Ave,Persistence}\right|\right) + DB_{capacity}$$

$$DB_{capacity} = \text{Greater of 1 MW or 2\% of last 7 day's } MAX\left(\left|SCE_{1\min\ Ave,Persistence}\right|\right)$$

$$SCE_{1\min\ Ave,Actual} = \text{Last 7 day's actual 1 minute average SCE}$$

$$SCE_{1\min\ Ave,Persistence} = \text{Last 7 day's 30-minute persistence schedule's 1 minute average SCE}$$

Equation 1- Capacity Component

5. Energy Component: For the energy component, the sum of the absolute value of the actual integrated imbalance over each 30-minute schedule interval should be less than or equal to the sum of the absolute value of the integrated imbalance over each 30-minute schedule interval from a calculated 30-minute persistence schedule plus an energy component deadband over the last seven (7) days. The energy component deadband is

the greater of 50MWh or 2 percent of the sum of the absolute value of the integrated imbalance over each 30-minute schedule interval from a calculated 30-minute persistence schedule over the last seven (7) days.

$$\sum \left| \frac{SCE_{30\min Ave,Actual}}{2} \right| \leq \sum \left| \frac{SCE_{30\min Ave,Persistence}}{2} \right| + DB_{energy}$$

$$DB_{energy} = \text{The greater of 50 MWh or 2\% of last 7 day's } \sum \left| \frac{SCE_{30\min Ave,Persistence}}{2} \right|$$

$$SCE_{30\min Ave,Actual} = \text{Last 7 day's actual 30 minute averaged SCE}$$

$$SCE_{30\min Ave,Persistence} = \text{Last 7 day's 30 - minute persistence schedule's 30 minute avera}$$

Equation 2 - Energy Component

6. Accumulated Energy Imbalance Component: In addition, the absolute value of the bias in energy imbalance accumulation over the last seven (7) days should be less than or equal to the bias resulting from 30-minute persistence scheduling plus an imbalance component deadband.

$$\left| \sum \frac{SCE_{30\min Ave,Actual}}{2} \right| \leq \left| \sum \frac{SCE_{30\min Ave,Persistence}}{2} \right| + DB_{imbalance}$$

$$DB_{imbalance} = \text{The greater of 50 MWh or 2\% of last 7 day's } \sum \left| \frac{SCE_{30\min Ave,Persistence}}{2} \right|$$

$$SCE_{30\min Ave,Actual} = \text{Last 7 day's actual HLH 30 minute average SCE}$$

$$SCE_{30\min Ave,Persistence} = \text{Last 7 day's 30 - minute persistence schedule's HLH 30 minute average SCE}$$

Equation 3 - Accumulated Energy Imbalance

7. Hours where an intra-hour schedule is not approved by an approval entity will be excluded from schedule accuracy analysis.
8. For CIH Pilot Resources scheduling generation to loads within the BPA BA, BPA will also verify that the CIH Balancing Resource is adjusting in conjunction with the wind resource schedule changes. BPA will check the intra-hour change in the sum of schedules for the CIH Balancing Resource against the intra-hour change for the CIH Pilot Resource to ensure that use of FCRPS balancing reserve capacity is reduced.

G. Notification of Participant Qualification for CIH Pilot Rate Discount

1. BPA will notify a potential CIH Pilot Participant when the potential participant has met

the pre-qualification requirements and the scheduling accuracy demonstration requirement and request written acknowledgment that the terms of this business practice will govern participation in the CIH Pilot. BPA must receive the written acknowledgement from the CIH Pilot Participant no later than 5 business days before the end of a month for the VERBS Rate for the CIH Pilot (Section III.E.5 of BPA's ACS-12 rate schedules) to apply beginning on the first day of the next month.

H. Notification of Failure to Meet Scheduling Accuracy and Termination

1. If the CIH Pilot Participant's schedule accuracy does not meet the Scheduling Accuracy Metrics, BPA will notify the CIH Pilot Participant within 10 Business Days by written notice. Upon receipt of such notice, the CIH Pilot Participant is expected to correct the scheduling accuracy within 24 hours.

2. If the failure to meet the scheduling accuracy metrics was caused by factors outside the control of the participant, such as a failure of iCRS or other data acquisition system problems, the Customer may submit the reasons and documentation and request that BA waive the failure. If BPA grants the request for waiver, BPA will notify the customer within 10 business days of receipt of the request and the failure will not count against the Customer.

3. After BPA issues two such unwaived notices, the next notice will require the CIH Pilot Participant to use mechanical persistence scheduling. Upon receipt of a notice with this requirement, the CIH Pilot Participant must notify BPA of their intent to comply within two Business Days, and execute the change in their scheduling systems within two weeks. During the intervening period the CIH Pilot Participant is expected to exercise due diligence to continue to achieve the expected scheduling accuracy.
4. A CIH Pilot Participant will have a one-time option for each of its resources participating in the CIH Pilot to terminate participation, with a minimum of 15 calendar day written notice to the CIH Pilot Participant's Transmission Account Executive. If such notice is received on or before the 10th of the month participation in the CiH Pilot will conclude on the last day of the month the termination notice was received in. If such notice is received after the 10th of the month participation in the CIH Pilot will conclude on the last day of the month following receipt of the termination notice. Upon cessation of participation in the CIH Pilot, BPA will provide and charge for standard VERBS for the remainder of the rate period. During the notice period, until the termination is effective, the CIH Pilot Participant must continue to schedule to the 30 minute persistence level of accuracy, using mechanical persistence scheduling if it has not met the scheduling accuracy requirement through other means. In addition, during the notice period, a CIH Pilot Resource's reserve allocation for DSO 216 limits will remain at the reduced amount associated with the Pilot. BPA will adjust the reserve allocation for a CIH Pilot resource to the level for standard VERBS on the first day of the first month beginning after the notice period.

5. BPA may terminate the pilot with 30 calendar day notice for cause.
6. BPA may initiate termination of the rate discount for participation by a CIH Pilot Participant upon 30 calendar days notice if any of the following conditions occur:
    a. The CIH Pilot Participant no longer has valid agreements with loads and sink BA(s) to accept schedules that vary every half hour, up to the full capacity of the CIH Pilot Resource. The CIH Pilot Participant must to notify BPA of such changes.
    b. The CIH Pilot Resource is sinking to load within the BPA BA and the CIH Balancing Resource is not changing schedules in response to the intra-hour adjustments.
    c. The CIH Pilot Participant has been provided with four or more notices of schedule error.
    d. Failure of the CIH Pilot Participant to convert to mechanical persistence based scheduling within two weeks of a notice requiring such conversion.
7. Upon termination by BPA, the CIH Pilot Participant, will receive standard VERBS for the remainder of the rate period and will be billed for the standard VERBS rate. If termination occurs mid-month, the participant will pay the standard VERBS rate for the entire month during which the termination occurs.

I. Procedure for Submitting CIH Pilot Schedules

1. A firm reservation is required to submit a schedule for a CIH Pilot Resource.
2. The POR for a CIH Pilot Resource located within BPA's Balancing Authority Area is the point where the CIH Pilot Resource is connected to BPA's transmission system.
3. The POR for a CIH Pilot Balancing Resource located within BPA's Balancing Authority is the point where the CIH Pilot Balancing Resource is connected to BPA's transmission system. The POD for a CIH Pilot Balancing Resource is the same POD used for the Participant[1]'s CIH Pilot Resource.
4. Additional scheduling procedures are outlined in the Intra-Hour Scheduling Business Practice.

J. Additional Information

Policy Reference

- 2012-2013 Transmission and Ancillary Service Rates

Related Business Practices

- Redispatch and Curtailment
- Requesting Transmission Service
- Scheduling Transmission Service
- Generation Imbalance
- Failure to Comply
- On Demand Resource[2] Scheduling
- Oversupply Management Protocol

Version History

Version 2	12/20/11 Version 2 of this Business Practice refines the scheduling accuracy metrics to make them more understandable and to add a dead band to the metric. This version also describes

[1]An entity that operates a Wind Facility or other Variable Energy Resource within BPA's Balancing Authority Area and that has signed a Supplemental Service Agreement agreeing to supply or purchase Supplemental Services for that Wind Facility.
[2]a. A resource located within BPA's Balancing Authority Area; b. An arrangement with a neighboring Balancing Authority that allows the delivery of power on BPA's system to or from a neighboring system; or c. A Demand Response Resource capable of meeting the technical requirements for an On Demand Resource.

	how BPA will treat specific intervals for scheduling accuracy metrics where generation levels may be affected by DSO216 or transmission curtailments. Specific changes include: Deleted step B.1.d; Added new section E; Rewrote steps F.1 amd F.7 and added steps F.2-F.6; Rewrote section G; Changed 15 calendar days to 10 business days in step H.1; Added step H.2; Added "unwaived" to step H.3; Moved section H to section D
Version 1	10/18/11 New business practice.In its 2012-2013 rate case, BPA proposed offering a Committed Intra-Hour Scheduling Pilot Program (CIH Pilot) under which wind generators that commit to submitting schedules every 30 minutes and meet scheduling accuracy metrics are eligible for a reduced Variable Energy Resource Balancing Service (VERBS) rate and are exempt from Persistent Deviation penalties. BPA's 2012-13 Rate Case Record of Decision adopted a rate discount and a forecast of balancing reserve capacity associated with the pilot. This business practice sets forth BPA's requirements for participation in the CIH Pilot and other details.